

Stoller

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July 2, 2007

Mr. Scott R. Surovchak
LM Site Manager
U.S. Department of Energy
11025 Dover Street, Suite 1000
Westminster, Co 80021-5573

Subject: Original Landfill Meeting Summary and Proposed Action Plan

Dear Mr. Surovchak:

This correspondence is to transmit the enclosed informal meeting summary reflecting the Rocky Flats Legacy Management Agreement party consultative process meeting on May 17, 2007, to come to agreement on a proposed course of action to address the Original Landfill cover performance issues that have been identified by inspections. This is submitted for information to recap the issues and proposed resolution.

Enclosed is the Proposed Action Plan to address these issues for DOE submittal to CDPHE for approval. The proposed general schedule is included in the Proposed Action Plan. A detailed schedule will be developed for further consultation after we have received feedback on the plan.

This Meeting Summary and the Proposed Action Plan is our update of the drafts transmitted to you on June 26, 2007, and reflects feedback from internal review and discussion.

We are proceeding with Phase I planning and subcontracting activities.

If you have any questions please feel free to contact me. I may be reached at 720/377-9674.

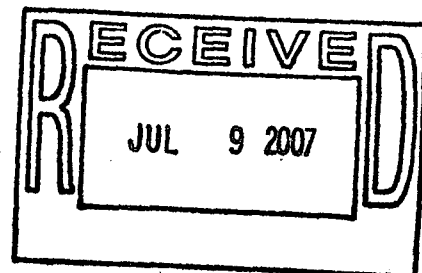
Sincerely,


Richard DiSalvo
Assistant Project Manager

Enclosures

cc:

Correspondence Control (thru C. Weston)
Project File: RFS 535.25 (thru rc-rocky.flats)



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ADMIN RECORD

PD-A-000016

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Meeting Summary
May 17, 2007
Original Landfill

Attendees: Carl Spreng, CDPHE; Larry Bruskin, CDPHE Engineer; Mark Aguilar, EPA; Vera Moritz, EPA; Norm Ng A Qui, EPA Consultant; Scott Surovchak, LM; Linda Kaiser, Stoller; Melvin Madril, Stoller Engineer; John Boylan, Stoller; Bob Prucha, Stoller Consultant; Jeremiah McLaughlin, Stoller.

Overview:

This was a consultative process meeting of the RFLMA parties to confer and develop a proposed course of action to address the need for and extent of repairs to the Original Landfill (OLF) cover and several observed issues with cover performance, as follows: Several slumps have developed in the area of the western and eastern ends of the cover, with some associated lateral movement, cracking and erosion; diversion berms in several spots appear to also be slumping or suffering from erosion; some erosion is occurring in the east and west perimeter channels; and several seeps are causing saturated areas in the cover surface. These issues were discussed and several near term and long term activities developed.

Most of the lateral movement is in the east and west perimeter channels. Much of the rest of the movement appears to be subsidence.

The original construction design forecast some cracking and subsidence, which was accounted for in the calculations and specifications. The subsidence we're seeing in the landfill is approximately within the range of the calculated amounts published in the OLF M&M Plan, although not in the exact locations calculated. The huge surplus of water from precipitation in late 2006 and early 2007 has accelerated the process of settlement. Normally we would anticipate at least 10 years for this amount of settling.

Seep 7 and the general west area

There is a vertical subsidence area below berm 1 just east of the west perimeter channel and slumps and evidence of seeps on the eastern bank of the west perimeter channel. There are tension cracks and some of the berms are settling. There is also a seep above the seep 7 drain capture area.

West area subsidence/slump

The subsidence depth in this area below berm 1 is about 2 feet, which is about what was predicted. The area between berm 1 and berm 3 on the western edge of the landfill cover is where the seeps and slumps are located. Seeps were observed there during construction; the measures taken at that time to address the seeps were not completely effective. In the larger subsidence areas, it appears that it's the fill material that's subsiding, not the waste. The berms were added to the design to minimize erosion from water flow.

The CDPHE engineer expressed the opinion that the failures observed were not merely due to subsidence but were due to circular rotational failures of the cover. The CDPHE engineer believes this area of the cover is slipping downhill.

The EPA landfill consultant stated that the calculated settlement points are for specific areas where we have a lot of data and those don't apply to the big slump area on the west. However, another EPA representative pointed out that there is a calculated settlement point in the middle of the slump that predicts 1.34 feet of settlement. The EPA landfill consultant stated that the areas of greatest concern during the design were east of that area. He agrees with the CDPHE that the cracks are due to the cover sliding and not to subsidence.

LM staff indicated that the slumped area has a lot greater depth of fill because that area was a valley prior to construction of the landfill.

The Stoller engineer indicated that we really need the geotechnical investigation proposed by LM before we can determine the mechanisms and develop the appropriate repairs. The EPA consultant agreed that more information is needed.

The CDPHE engineer stated that loading the top or cutting the toe of the slope would increase the problem. Classically, in slope failure, the solutions are to add to the buttress or flatten the slope. He stated again that he believes the problem is slope instability and not subsidence.

The group agreed that the right understanding of the failure mechanisms is required before selecting and implementing a solution.

West perimeter channel slumps and seeps

The west perimeter channel was discussed. It may be that the deep cut excavated to form the channel is contributing to the instability in this area, and that redesign of the channel should be considered. Again, the planned geotechnical investigation will provide more information about this problem.

The source of the seep into the west perimeter channel should be investigated since that seep is important to the overall investigation and solution.

The channel is in the same place as a pre-existing channel that was incorporated into the design. They thought it would be stable but it's not. The material is VERY wet and some of it looks like colluvium. Seep 5 is in that general area. The channel will need to accommodate the 1000 year storm flow if we modify it.

Seep above seep #7

LM described one alternative for dealing with flow from seep 7 would be to extend the existing seep 7 collection system to collect this water.

Status of groundwater model update

The east and west perimeter channels and berm #1 were not included in previous models. Maps were provided showing preliminary modeling results. Weathered bedrock is found very close to the surface in some places. This correlates with shallow groundwater and seeps. The Stoller consultant has found a pretty good correlation overall between the model and where we're seeing the seeps. He doesn't have good meteorological data for the area so he used data from 1999-2000 since it was similar to what 2006-2007 has been. The group suggested that NREL might have data that could be used for the model simulation.

Berm height and channel grade

The Stoller engineer provided sketches to show how the berms were designed and constructed, and explained the differences between the "as-built" berms and their specifications in the OLF M&M Plan. The berms were actually constructed to a height of 1.94 feet or higher, rather than the minimum maintenance criterion of 2 feet as discussed in the OLF M&M Plan; as a result, they were actually constructed about half a foot shorter than the design criterion for a 100-year flood with freeboard, although they are still sufficient to convey a 1000-year flood. The group agreed we need to look at flow area calculations and constructability to determine the correct berm height to maintain.

The 2% slope of the channels was defined to keep water moving but minimize erosion. The recently surveyed grades don't match the 2% in some places, but each berm is at least 2% overall. Per the CDPHE landfill engineer, there was a design change during construction that was apparently not incorporated into the OLF M&M plan. LM will try to find the old records. The group agreed that the slope should be maintained at 2% overall for each channel and not 2% in each segment, as long as flow is maintained.

The group agreed that the OLF M&M plan should be changed to reflect what is needed for good performance. LM will develop proposed wording.

RF alluvium is a hard material to work with. The group discussed whether there is a better material that will give us good soil performance and still allow vegetation growth. Alternate materials will be proposed in the OLF M&M Plan revisions as appropriate.

The OLF M&M Plan revisions will be carefully considered to allow us to maintain required performance but not be overly prescriptive.

Tension Cracks

When we repair these, we need to minimize new soil additions so as to limit the added weight, and instead try to repair these cracks by grading and compacting. However, the 2 foot cover still needs to be maintained over the waste. Each area will need to be looked at to see what's appropriate.

Hanging Berms on east side

The end of berm #7 has slid into the east perimeter channel, probably because there is too much weight hanging out over the channel. The proposed repair for these is to change the shape of the berm as necessary to stabilize it.

East side subsidence

There are no cracks and we don't want to add a lot of new soil so we'll manage the area to make sure there's no standing water.

Consolidation monitors

For short-term monitoring to help us understand what's happening with slump features, we can use simple (rebar or blocks) monitoring devices as reference points to check local elevations. Survey grade GPS is OK for this monitoring.

Settlement monuments

Two monuments are not yet installed. Monument D cannot be installed because the area is too wet and it's not likely to dry out. This one can be moved to a different location on the buttress. It can be field located and then the location surveyed in. Monument E has not yet been installed because it is right in the middle of the slump area on the west side. This one will be installed after the final grading and repair of this area.

Long Term Plans

Points to consider as long-term plans are developed:

- The landfill perimeter channels and possibly Seep 7 may need some additional water controls for stability; however, if we remove too much of the water plants and grass necessary for soil stabilization cannot grow.
- Deep-rooted plants are already trying to re-establish. How hard do we need to fight them? Can we let them work for us instead? They could provide both slope stability and water removal.
- The CDPHE engineer indicated that he didn't see how deep-rooted plants would help prevent the kinds of failures we've seen. There are better ways to increase evapotranspiration than deep-rooted plants. Subtitle C facility requirements are an ARAR and so deep-rooted plants would be prohibited. However, the EPA consultant pointed out that there is a big difference between what could be allowed on the waste footprint and what could be allowed off the waste footprint. It was also noted that the costs to continually remove these plants would be high, and even if the plants were removed, remnants of their root systems would still penetrate the cover material after the plants had been removed. The CDPHE representatives indicated that internal discussion would be required before they could decide if deep-rooted plants could be allowed.

There was discussion on when public comment would be required. DOE opinion is that public comment is not needed unless the remedy is changed. EPA opinion is that a major change to the design would require public comment.

Agreements:

- 1) DOE will develop a work plan that the CDPHE can approve.
- 2) The work will proceed in phases, with short term actions followed by investigation and long-term repairs.
- 3) Consolidation monitors can be installed now.

Proposed Action Plan for OLF Cover Repairs and Geotechnical Investigation

Phase 1: West area slump at and below Berm 1, settlement monument completion, and cover/stormwater management structure maintenance activities.

Phase 1 includes installing consolidation monitors and completing the installation of settlement monument D. It also includes performing other maintenance in accordance with the OLF M&M Plan. The specific activities identified in the OLF M&M Plan are:

Subsidence/Consolidation - Section 3.2.1, Monitoring Locations and Procedures – Consolidation monitoring devices will be installed in the west area and monitored to evaluate conditions. Settlement monument E is not needed at this time, since the slump is already identified and investigation is a component of Phase 2 of this plan. Settlement monument E will be installed after consideration of the results of the investigation and completion of any repairs to this area. Settlement monument D installation, which has been delayed due to wet conditions, will be installed by July 31, 2007, unless conditions still are prohibitive. If not installed by July 31, 2007 an alternative location for settlement monument D will be proposed by July 31, 2007 for CDPHE approval. After CDPHE approval of the alternative location, the settlement monument installation shall be complete 15 days thereafter unless adverse weather conditions cause delays, in which case it shall be completed as soon as feasible.

Soil Cover - Section 3.4.2, Maintenance Action Activities – Soil replacement (if necessary) and regrading affected areas (cracks, vertical displacement) will be conducted to fill in the cracks to minimize water infiltration and potential for cover erosion. These actions will also maintain the minimum design soil cover thickness of two feet. Disturbed areas will be revegetated and erosion control measures will be employed in regraded areas to address further erosion potential. A record of the amount of replacement soil and the locations where replacement soil is used will be kept. A record of the areas where regrading is performed, including an evaluation of cover thickness to meet the 2 foot thickness criteria, will also be kept.

Stormwater Management Structures – Section 3.6.2, Maintenance Action Activities – Filling and regrading of eroded areas of berms to restore design characteristics of the structure to convey surface water runoff to the perimeter channels. The east end of Berm 7 has slumped into the east perimeter channel, but does not affect surface water conveyance characteristics of this area and does not need to be regraded, except if needed to address erosion potential in this area. Disturbed areas will be revegetated and erosion control measures will be employed in regraded areas to address further erosion potential. A record of the amount of replacement soil and the locations where replacement soil is used will be kept. A record of the areas where regrading is performed, will also be kept.

These Phase 1 activities will continue as necessary during the conduct of Phase 2, and the results of these activities will also be considered in design and construction activities in

Phase 3. The records of repairs, as described above, will be included with monthly inspection reports.

Phase 2: Geotechnical investigation of slumps and subsidence and seep drain alternatives.

Phase 2 will include geotechnical investigation to confirm and better understand the mechanisms that are causing the slumps and subsidence. The investigation will include evaluation of the impact to slope stability and of runoff controls for seeps on the cover. If redirection of runoff or seep flow is necessary, an evaluation of reasonable alternatives for redirecting flow will also be conducted. The investigation will be outlined in a plan that will be submitted to CDPHE for approval. The investigation is expected to be completed by September 30, 2008, and the specific schedule will be provided after the investigation plan is approved. In parallel with the geotechnical investigation, recommended changes to the OLF M&M Plan will be developed. Information from the geotechnical investigation will be used in developing these recommended changes. Regulatory approval will be obtained for the OLF M&M Plan changes and the proposed path forward for repairs. Additionally, the last settlement monument (E) will be installed and surveyed.

Phase 3: Design and Construction Activities

Phase 3 will include the design and construction of the approved repairs. This phase will not begin until after Phase 2 is completed so that the appropriate geotechnical investigations, RFLMA consultative process, regulatory approvals, and public comment (if required) can be completed. The scope and schedule of this phase will depend on the outcome of Phases 1 and 2. This phase is currently expected to include berm recontouring, slump or subsidence repair, east and west perimeter channel repair, and seep/water control.